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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER

DOLAN, JENNIFER M

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 12/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/895,478

Applicant(s)

HARNDEN ET AL.

Examiner

Jennifer M. Dolan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This action is in response to Amdt. B, filed 10/8/02

Allowable Subject Matter

1. The indicated allowability of claims 1-7 is withdrawn in view of the newly discovered references. Rejections based on the newly cited references follow.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "the notch" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b)

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only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1-3 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,194,777 to Abbott.

Regarding claim 1, Abbott discloses a small footprint semiconductor device package comprising: a plastic package body (230) for enclosing a die (240), the plastic package body including a top coupled to a bottom through a plurality of sides (figures 2, 4a, 4b, and 4c); a lead (205/05) including an enclosed portion by the package body and in electrical communication with the die (figure 2), and an exposed portion of the lead extending from the side of the package body (figure 4c), folding back along the side of the package toward the bottom of the package (figures 4a and 4c) at a first angle, and folding toward a center of the bottom of the package to form a lead foot (figure 4c), whereupon the portion of the lead along the side of the package (vertical section) and the portion of the lead along the bottom of the package (bottom of lead in figure 4c) form an angle of less than 90 degrees from each other (figure 4c), and the lead foot is inclined at a second angle relative to an underlying planar PC board (410; figure 4c) to promote solder wetting (inherent from the lead foot shape and inclination).

Regarding claim 2, Abbott discloses that the die is an integrated circuit (column 1, lines 14-22; column 3, line 67-column 4, line 2).

Regarding claim 3, Abbott discloses that the lead forms a reverse gull wing shape (figure 4c).

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6. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,114,759 to Okuaki et al.

Regarding claim 1, Okuaki discloses a small footprint semiconductor device package comprising: a plastic package body (3b, 5b) for enclosing a die (column 1, lines 5-37), the plastic package body including a top coupled to a bottom through a plurality of sides (figures 1, 3, and 5); a lead (3a, 5a) including an enclosed portion by the package body and in electrical communication with the die (column 1, lines 20-37), and an exposed portion of the lead extending from the side of the package body, folding back along the side of the package toward the bottom of the package at a first angle (figures 3 and 5), and folding toward a center of the bottom of the package to form a lead foot (figures 3 and 5), whereupon the portion of the lead along the side of the package and the portion of the lead along the bottom of the package form an angle of less than 90 degrees from each other (figures 3 and 5; angle = $90 \text{ degrees} - \alpha$; column 8; lines 32-48); and the lead foot being inclined at a second angle (α) relative to an underlying planar PC board (column 1, lines 37-45) to promote solder wetting (inherent, due to the shape and inclination of the lead foot).

Regarding claim 3, Okuaki discloses that the lead forms a reverse gull wing shape (figures 3 and 5).

7. Claims 1, 3, 4, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,111,312 to Hirimuta et al.

Regarding claim 1, Hirimuta discloses a small footprint semiconductor device package comprising: a plastic package body (13) for enclosing a die (12), the plastic package body

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including a top coupled to a bottom through a plurality of sides (figure 4); a lead (14) including an enclosed portion (15) by the package body and in electrical communication with the die (figure 4), and an exposed portion of the lead (16) extending from the side of the package body, folding back along the side of the package toward the bottom of the package at a first angle (substantially vertical portion; figure 4), and folding toward a center of the bottom of the package to form a lead foot (figure 4), whereupon the portion of the lead along the side of the package and the portion of the lead along the bottom of the package form an angle of less than 90 degrees from each other (figure 4; side portion is substantially vertical, and foot portion is inclined upwards from a horizontal line); and the lead foot being inclined at a second angle (figure 4) relative to an underlying planar PC board (22, column 2, lines 26-32) to promote solder wetting (inherent, due to the shape and inclination of the lead foot).

Regarding claim 3, Hirusuta discloses a reverse gull wing shape (figure 4).

Regarding claim 4, Hirusuta discloses that the package has a reduced package profile including the lead (figure 4; column 2, lines 19-23; column 6, lines 56-64).

Regarding claim 6, Hirusuta discloses that the package body further comprises a notch (24) configured to receive a portion of the lead foot (16a; figure 4), thereby permitting the lead foot to be partially recessed within the package body (figure 4) in order to reduce a height of the package.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuaki.

Okuaki discloses a small angle inclination of the lead foot relative to the planar PC board (figures 3 and 5), but is silent as to the exact angle.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify in Okuaki an angle of inclination between the lead foot and the PC board of 1 – 7 degrees. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to select an angle between 1 and 7 degrees, because by slightly bending the free end of an outer lead away from the PC board promotes solder wetting (column 3, lines 12-21), but bending the free end at a large angle decreases the contact area between the leads and the PC board, which can decrease the bond strength, and could additionally cause an increase in the total package height. It is well within the purview of a person having ordinary skill in the art to select an angle between 1 and 7 degrees to optimize the solder wetting, bond area, and package height. Although Okuaki fails to specify the exact angle of inclination of the lead foot, it has been held that “where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (1955).

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirimuta et al. in view of U.S. Patent No. 6,433,418 to Fujisawa et al.

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Hirumuta fails to disclose that the notch includes a depth of about two thirds of the thickness of the lead.

Fujisawa discloses a notch (28a) that includes a depth of about two-thirds of the thickness of the lead (figures 8 and 9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the notch of Hirumuta so that the depth is about two-thirds of the thickness of the lead, as taught by Fujisawa. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide a notch with a depth as specified, so that the device can be easily stacked, yet maintain a small profile (figures 12 and 13), and so that damage to the leads during assembly or mounting, in the form of short circuiting or deformation, can be avoided (column 8, line 64 – column 9, line 17).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,435,222 to Sato discloses a leadframe for an electronic part that uses a lead extending along the side and a lead foot forming an angle of 80 degrees with each other; a lead foot inclined relative to a planar PC board, and notches configured to receive the lead foot.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (703) 305-3233.


The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (703) 305-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd
December 19, 2002


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800